

1816: “The Mighty Operations of Nature”:
Societal Effects of the Year Without a Summer

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In 1860, on the eve of the Civil War, Chauncey Jerome, a 67-year-old New England clocksmith, recalled in his memoirs a particularly memorable summer that had occurred forty-four years before.¹ “I well remember on the seventh of June,” he wrote, “while on my way to work...my hands got so cold that I was obliged to lay down my tools and put on a pair of mittens which I had in my pocket.” He noted that it snowed an hour that day. He also described the Fourth of July celebrations in Plymouth, Connecticut: “I saw several men pitching quoits in the middle of the day with thick overcoats on, and the sun shining bright at the same time. A body could not feel very patriotic in such weather.”²

Jerome was remembering a curious and unsettling event in environmental history: a dramatic example of large-scale temporary global climate change, which in the United States came to be memorialized as the “Year Without a Summer.” In the same strange season that Chauncey Jerome watched Fourth of July celebrants play outdoor games in heavy overcoats, John Quincy Adams, then U.S. Minister to Great Britain, noted in a letter to his mother Abigail that that there had scarcely been a day in the entire year of 1816 that a fire was not needed indoors.³ Snow fell in western New York State on July 8; the next month, in the same place, a high temperature of 80 degrees was recorded on the same day the temperature plunged low enough to frost at night.⁴ In West Chester, Pennsylvania, a hail of stones—quartz, feldspar, and flint, none of local origin—rained down on a house during a violent thunderstorm.⁵ Forests and fields, their yields stunted by numerous hard frosts in August and September and parched by

¹ This paper is condensed from my master’s thesis, titled *1816: “The Mighty Operations of Nature”: An Environmental History of the Year Without a Summer*. I would like to acknowledge the assistance of Matthew Dennis and Marsha Weisiger at the University of Oregon, Tom Swetnam at the Laboratory of Tree-Ring Research at the University of Arizona, and the research assistance of Cody Climer and Freddy De La Torre.

² Chauncey Jerome and Lockwood Barr, *History of the American Clock Business for the Past Sixty Years and Life of Chauncey Jerome* (New Haven, CT: F.C. Dayton, Jr., 1860), 31-32.

³ Letter, John Quincy Adams to Abigail Adams, London, September 20, 1816, in *Writings of John Quincy Adams*, ed. Worthington Chauncey Ford (New York: The MacMillan Company, 1916), VI: 90-91.

⁴ *Columbian Register* (New Haven, CT), August 17, 1816, 2; *Albany Argus* (Albany, NY), August 23, 1816, 3.

⁵ *Essex Register* (Salem, MA), July 10, 1816, 3.

drought, became tinderboxes. In Maine, they exploded into widespread fires, generating colossal clouds of smoke that blanketed New England. For many people the bizarre summer ended under a gloomy shroud that seemed something like the coming of the apocalypse.⁶

The effects of the weather anomalies rippled outward as people responded to them in political, religious, and cultural terms. Church attendance in Europe and many parts of the United States increased markedly, as beleaguered farmers offered daily prayers to God to stop the unfavorable weather.⁷ In Vermont, a minister credited the gloom and alarm caused by the weather as the impetus for a religious revival that delivered the entire town of Poultney into newfound Christian salvation.⁸ The Year Without a Summer proved to have a lasting effect on English literature. The weather was so bad in Switzerland that summer that Mary Wollstonecraft Shelley, John William Polidori, Percy Bysshe Shelley, and Lord Byron, vacationing at the Villa Diodati on the shores of Lake Geneva, were forced to stay indoors. To amuse themselves, Shelley and her literary cohort gathered around the blazing fireplace and told ghost stories—where she hatched her classic novel *Frankenstein*.⁹

Nearly a century later, in 1913, scientists began to propose the answer that is widely accepted today as the cause of the Year Without a Summer.¹⁰ In April 1815, the volcano Mt. Tambora, located in what is now Indonesia, erupted catastrophically. This eruption was the largest single volcanic event in recorded history, ten times more powerful than the 1883 eruption of Krakatoa (also in Indonesia) and one hundred times more powerful than the 1980 eruption of

⁶ *Albany Argus* (Albany, NY), September 20, 1816, 2; *Richmond Enquirer* (Richmond, VA), October 19, 1816, 4.

⁷ *Columbian Register* (New Haven, CT), September 21, 1816, 2; John Milton Whiton, *Sketches of the History of New-Hampshire From its Settlement in 1623 to 1833: Comprising Notices of the Memorable Events and Interesting Incidents of a Period of Two Hundred and Ten Years* (Concord: Marsh, Capen and Lyon, 1834), 189.

⁸ Joshua Bradley, *Accounts of Religious Revivals in Many Parts of the United States from 1815 to 1818* (Wheaton, IL: Richard Owen Roberts, 1980), 138.

⁹ Mary Wollstonecraft Shelley, *Frankenstein, or The Modern Prometheus* (London: Thomas Davison, 1823), ix. Polidori's 1819 novella *The Vampyre* is also said to have originated in this setting.

¹⁰ William J. Humphreys, "Volcanic Dust and Other Factors in the Production of Climate Changes, and Their Possible Relation to Ice Ages," *Journal of the Franklin Institute* 176 (August 1913): 131-72.

Mt. St. Helens.¹¹ After a large eruption, particulate matter, especially sulfur dioxide, can remain suspended in the upper stratosphere for years, scattering solar energy that would otherwise have reached—and warmed—the surface of the Earth.¹² In the 21st century scientists have uncovered evidence that a previous major eruption occurred somewhere in tropical latitudes in the early months of 1809, meaning that Tambora exacerbated a situation that was already occurring.¹³ The 1815 Tambora event fits into a broader context of rapid global climate change events caused by volcanic eruptions, which scholars have only begun to identify in the historical record.¹⁴

The Year Without A Summer and the Pastiche of Knowledge

Historical treatment of the Year Without a Summer has generally been scant and dismissive. Historians have tended to view it as an amusing aside, an isolated incident noteworthy for its anomalous nature and its tendency to generate colorful folklore, but generally irrelevant to the broader political and social history of the Early Republic.¹⁵ As a result

¹¹ C. Oppenheimer, “Climatic, Environmental and Human Consequences of the Largest Known Historic Eruption: Tambora Volcano (Indonesia) 1815,” *Progress in Physical Geography* 27, no. 2 (June 2003): 230-59.

¹² Henry Stommel and Elizabeth Stommel, “The Year Without a Summer,” *Scientific American* 240, no. 6 (June 1979): 176.

¹³ Jihong Cole-Dai, David Ferris, Alyson Lanciki, et. al., “Cold Decade (AD 1810-1819) Caused by Tambora (1815) and Another (1809) Stratospheric Volcanic Eruption,” *Geophysical Research Letters* 36, no. L22703 (November 21, 2009). This evidence consists of layers of volcanic fallout detected in ice cores taken in Greenland and Antarctica. Only a massive eruption in tropical latitudes could eject sulfur dioxide into the atmosphere on the scale necessary to result in the deposition of fallout simultaneously in both polar regions.

¹⁴ In addition to the Year Without a Summer, there are two prominent examples of climate change events of this nature. The first is the period of darkness in 535-36 B.C.E., where sources in China and the Middle East speak of the sun being blotted out for eighteen months; this period coincides with massive population shifts, catastrophic wars, and a worldwide epidemic of the bubonic plague. The second is the great famine that swept Europe in 1315-17, which historians have linked to a volcanic eruption in what is now Indonesia. David Keys, *Catastrophe: An Investigation Into the Origins of the Modern World* (New York: Ballantine, 1999), 249-66; Norman Cantor, *In the Wake of the Plague: The Black Death and the World it Made* (New York: Free Press, 2001), 74. The most serious potential volcanic climate change event is the “Toba Catastrophe Theory.” This theory holds that about 75,000 years ago a volcano called Toba—located in the same region as Tambora and Krakatoa—erupted with more violence than any eruption recorded in modern history, and this event resulted in global climate changes so severe that they may have wiped out almost all human beings then living on Earth. Michael R. Rampino, Stephen Self, and Richard B. Strohers, “Volcanic Winters,” *Annual Review of Earth Planetary Science* 16 (1988): 73-99; Stanley H. Ambrose, “Late Pleistocene Human Population Bottlenecks, Volcanic Winter, and Differentiation of Modern Humans,” *Journal of Human Evolution* 34 (1998): 623-51.

¹⁵ See, e.g., Daniel Walker Howe, *What Hath God Wrought* (New York: Oxford University Press, 2007), 30-31. Even Carl Edward Skeen’s survey of the year 1816 itself treats the weather anomalies as little more than an interesting aside, covered in one chapter. Carl Edward Skeen, *1816: America Rising* (Lexington, KY: University of Kentucky

professional scholarship on the subject of the 1816 anomalies is dominated not by historians but by scientists, particularly climatologists, whose main areas of interest concern the cause and scientific examination of the phenomena.¹⁶ Yet despite the lack of interest by historians, the Year Without a Summer has a saturation in folk consciousness and popular culture extraordinary for an event that occurred nearly 200 years ago. Many people today recall hearing or reading something about it; blogs, articles, and forum posts on the Internet continually revisit it;¹⁷ the phrase “Eighteen Hundred and Froze to Death,” evidently a genuine contemporary colloquialism,¹⁸ is firmly entrenched in American folklore.¹⁹ Clearly, something about the event continues to intrigue and fascinate the public.

The central argument of this paper is that the climate change events of 1816 illustrate broader trends in how people viewed their relationship to their environment, and reactions to the events show an embryonic appreciation of humans’ delicate and precarious position in a changing world that was incapable of being fully understood. The people of the time drew their understanding of their environment from an amalgam of sources: part empirical science and part superstition, seasoned with practical observation and animated by folklore. This body of understanding can be described as a pastiche of knowledge. The pastiche of knowledge did not purport to be comprehensive or capable of explaining everything. There remained a gap between

Press, 2003), 10-13.

¹⁶ See, e.g., Henry Stommel and Elizabeth Stommel, *Volcano Weather: The Story of 1816, The Year Without a Summer* (Newport, RI: Seven Seas Press, 1983); Oppenheimer, “Climatic, Environmental and Human Consequences,” 230-259.

¹⁷ See, e.g., “The Year Without a Summer in Jane Austen’s Life,” *Jane Austen’s World*, October 2, 2007, <http://janeaustensworld.wordpress.com/2007/10/02/the-year-without-a-summer-in-jane-austens-life/> (accessed February 27, 2011).

¹⁸ Stommel and Stommel, *Volcano Weather*, 19.

¹⁹ See, e.g., Jaime McLeod, “The Year Without a Summer,” *Farmer’s Almanac Blog*, March 22, 2010, <http://www.farmersalmanac.com/weather/2010/03/22/the-year-without-a-summer/> (accessed February 28, 2011). A Google search for the phrase “Eighteen Hundred and Froze to Death” results in over 7,000 hits, most of them short articles of a general nature emphasizing folklore and local history particularly from New England. There is even a “fan” page on Facebook entitled “Eighteen Hundred and Froze to Death” at <http://www.facebook.com/pages/Eighteen-hundred-and-froze-to-death/143764325637118> (accessed February 28, 2011).

what the people of 1816 knew about the natural world and what their knowledge base was competent to explain. Their reactions—scientific, political, and cultural—to an event that was essentially inexplicable show a curious collective negotiation with the practical limits of understanding.

Sunspots and Earthquakes: Arguing Causes

One of the key conversations that took place among the American public and in the broader Atlantic world in the summer of 1816 concerned the cause of the climate events. The most common theory involved sunspots: dark patches on the visible disk of the sun, which modern science explains as temporary localized areas of inhibited convection in the photosphere.²⁰ Newspapers from that summer devoted an extraordinary amount of attention to sunspots—attention that at times borders on obsession. For example, the *Daily National Intelligencer*, a Washington, D.C. paper regarded as the *de facto* mouthpiece of the Madison administration, carried a lengthy series of articles reporting on the nature, appearance, and progression of sunspots.²¹ A Boston newspaper remarked that “by a strange coincidence, the coldness of the present season...has chilled the earth at the very period where those spots were largest and occurred most frequently.”²² Many people reasoned that sunspots blocked out solar energy that would otherwise have reached the Earth, thus resulting in cooler weather.²³

Various experts and pseudo-experts took to the editorial pages to denounce this idea, among them noted British astronomer William Herschel, who insisted that increased sunspot activity actually made weather *warmer*.²⁴ “The notion [of sunspots cooling the earth] is so

²⁰ These areas of inhibited convection have a cooler temperature than the surrounding areas on the surface of the Sun. Consequently, they appear as dark spots. David Alexander, *The Sun* (Santa Barbara, CA: ABL CLIO, 2009), 69.

²¹ See, e.g., *Daily National Intelligencer* (Washington, D.C.), May 1, 1816, 3.

²² *Boston Intelligencer* (Boston, MA), September 7, 1816, 2.

²³ *Daily National Intelligencer* (Washington, D.C.), May 9, 1816, 3.

²⁴ *Richmond Enquirer* (Richmond, VA), August 31, 1816, 4.

generally laughed at,” said one newspaper correspondent, “that one dare hardly ask...[But] is it certain that ‘the thing is impossible?’”²⁵ John Quincy Adams provided an appropriate summation of the controversy when he wrote, “What agency the spots in the sun have had in all this is more than I, or perhaps anybody else is astronomer enough to know.”²⁶

In fact, although most observers in 1816 were convinced that sunspot activity was at an all-time high, scientific analysis reveals that the opposite was true. Sunspots wax and wane on an eleven-year cycle. Not only did 1816 fall on the down-slope of one of these eleven-year cycles, but it also fell into a larger pattern of decreased sunspot activity in general, called the “Dalton Minimum,” where sunspots were even rarer than they would otherwise have been.²⁷ Why, then, did people seem to see sunspots so much more often in 1816? Volcanic dust from Tambora suspended in the atmosphere dimmed the appearance of the sun slightly during the day, making sunspots much more easily visible with the naked eye than at other times. Comparison of historical accounts of the appearance of various lunar eclipses supports this observation. There was a total lunar eclipse, visible from Boston and London, on June 9, 1816. Not surprisingly, thanks to Tambora’s dust cloud, it was the “darkest” lunar eclipse ever recorded.²⁸

Aside from sunspots, people posited various other causation theories. Some argued the anomalies were caused by icy winds blowing across glaciated areas, though explanations for why wind patterns should change so drastically were harder to find.²⁹ One writer in the *Daily National Intelligencer* floated a creative idea that the end of the Napoleonic Wars in Europe was

²⁵ *Boston Independent Chronicle* (Boston, MA), June 10, 1816, 2.

²⁶ Letter, John Quincy Adams to Abigail Adams, September 20, 1816, in *Memoirs of John Quincy Adams, Comprising Portions of His Diary from 1795 to 1848*, ed. Charles Francis Adams (Philadelphia: J.B. Lippincott & Co., 1874), III: 404-05.

²⁷ Wagner, Sebastian and Eduardo Zorita, “The Influence of Volcanic, Solar and CO₂ Forcing on Temperatures in the Dalton Minimum (1790-1830): A Model Study,” *Climate Dynamics* 25 (March 2005): 205-218.

²⁸ Richard B. Strothers, “Stratospheric Transparency Derived from Total Lunar Eclipse Colors,” 1801-1881, *Publications of the Astronomical Society of the Pacific* 117 (December 2005): 1445-1450.

²⁹ *Columbian Register* (New Haven, CT), July 27, 1816, 2.

a factor. He argued that smoke from frequent widespread musket fire somehow made the planet warmer, and the return of peace would naturally bring cooler temperatures.³⁰ Another correspondent claimed that the planet had been cooling since the great Lisbon earthquake of 1755, a theory allegedly supported by the testimony of German brewers and Swiss vintners.³¹ The 1755 Lisbon earthquake was a tremendous shock to the western world in the Enlightenment era, and it directly and indirectly motivated efforts to better understand earth sciences.³² Given the impact this event had on the psyche of the Atlantic world, it is not surprising that it was considered as a potential cause.

All of these various causation arguments illustrate how the pastiche of knowledge functioned to try to explain the unexplainable. The Year Without a Summer occurred in what was in many ways a transitional period in how science was perceived as a means for understanding the processes of the physical world. Writers' constant invocations of scientists such as William Herschel show that expert scientific testimony could and did have public cachet. But 1816 was an era in which *institutional* science—organized bodies of credentialed experts in carefully-delineated specialized fields, with common standards of proof and methodology—was in its infancy. Herschel had his views on what sunspots were and how they were affecting the weather, but these views competed on a more or less equal playing field with the supposition of the German brewers and Swiss vintners who insisted the Lisbon quake was at the root of it all. This demonstrates an uneasy coexistence in the public consciousness between scientific understanding on the one hand, and knowledge derived from more common sources, such as the practical experience of farmers or artisans, on the other.

³⁰ *Daily National Intelligencer* (Washington, D.C.), September 3, 1816, 2.

³¹ *Camden Gazette* (Camden, SC), September 12, 1816, 1.

³² Jelle Zeilinga de Boer and Donald Theodore Sanders, *Earthquakes in Human History: The Far-Reaching Effects of Seismic Disruptions* (Princeton: Princeton University Press, 2005), 88.

The character of this pastiche of knowledge is illustrated perfectly by the numerous farmers' almanacs that abounded in this period, especially in New England. These books contain precise astronomical and scientific data alongside religious verse, amusing folk tales, and practical agricultural and husbandry advice.³³ Almanacs often contained blank pages which people used for diary entries. In one such almanac Joseph Trumbull, a resident of central Massachusetts, disclosed that sunspots were on his mind during the time of the climate anomalies. In a diary entry made opposite a page of astronomical tables for May 1816, Trumbull wrote a short paragraph with the title "Solar Spots," and remarked, "It is a well known principle that an affect produced by the continued agency of any cause is not simultaneous with the agency." This observation appears amidst pages littered with small notations about weather events and the state of the harvest. Nowhere does he specifically assert astronomical phenomena as the cause of the weather oddities, but the entry indicates he may have considered it.³⁴

Trumbull's almanac-diary is an example of how the pastiche of knowledge shaped the environmental worldview of the people of 1816. Because it was an amalgam of knowledge derived from many sources, there was no particular expectation that the pastiche of knowledge was infallible or comprehensive. The reality that some things are inherently unexplainable was a key element of this worldview, but at the same time these limitations made people uneasy. When one steps back and considers the early 19th century as a time of transition between a world of superstition and faith and the newly-emerging modern order of Enlightenment-guided science and reason, the tension between acceptance of the inexplicable and unease at the failure to explain certain things is evident. The world of 1816 was not rocked to its foundations by the

³³ See, e.g., *The Clergyman's Almanack; Or, an Astronomical Diary and Serious Monitor, For the Year 1816* (Boston: Printer for the Author, 1815).

³⁴ Joseph Trumbull, Diary, May 1816, Trumbull Family Papers 1773-1903, Mss. Octavo Vols. T, Vol. 6, American Antiquarian Society Archives, Worcester, MA.

climate anomalies, but neither did it simply shrug them off and take no notice.

Political Reactions: Humor, Harvests, and Denial

The Year Without a Summer was an election year in the United States. The climate anomalies had political ramifications, or at least were interpreted, in some cases, in political terms. At the time Americans did not regard 1816 as a pivotal electoral contest on the national level; James Monroe, last of the founding fathers, was elected president that fall with only token opposition from the Federalist Party, then nearing the end of its terminal decline after a series of disastrous political miscues during the War of 1812.³⁵ A closer analysis reveals potential connections between the climate events and political response at a deeper level. Historian Carl Edward Skeen suggests that the weather events may have contributed to the electorate's sour mood which swept an unprecedented number of Congressional incumbents from office.³⁶ This suggestion is not supported by any direct evidence, but there are other examples of the extremely subtle ways in which the weather events and their effects became incorporated into political discourse in that election year. After a heavy and unseasonable rainstorm a Connecticut paper joked that there was no damage from the weather, "excepting the destruction of a few packages of federal electioneering handbills"—supposedly a harbinger of Federalist prospects at the polls a few weeks later.³⁷ Another political humorist, repeating the widely-reported prophecy that sunspots would grow to obscure the sun and extinguish it, suggested that this would not cause the end of the whole world, but merely of Vermont, unless the state changed its political affiliation.³⁸

While the climate anomalies were going on, newspapers frequently commented and

³⁵ Noble E. Cunningham, Jr., *The Presidency of James Monroe* (Lawrence, KS: University Press of Kansas, 1996), 15-26.

³⁶ Skeen, *1816: America Rising*, 12-13.

³⁷ *Columbian Register* (New Haven, CT), September 14, 1816, 3.

³⁸ *Green-Mountain Farmer* (Bennington, VT), June 3, 1816, 2.

conjectured about the coming harvest. These comments and predictions operated in a political context. Although no sample of Early Republic press material, however selected, can be considered wholly representative of national mood, there is some evidence for a weak correlation between political affiliation and optimism or pessimism about the harvest prospects. Stories from newspapers of both parties in New England, the Mid-Atlantic region, and the South fall into rough categories of “harvest downbeat” stories—usually reporting weather events or crop damage and adding gloomy predictions about harvests in general—and “harvest upbeat” stories, often containing less hard news of specific events but predicting that fall harvests would not be as bad as generally feared. “In this place we have had frost five successive nights,” one harvest downbeat story reported. “The farmer’s prospects are at present quite unpromising.”³⁹ A harvest upbeat story, by contrast, quoted “a gentleman” who “informs us that the crops in general are very good....We believe that reports of scanty crops have been very exaggerated.”⁴⁰ Despite fewer Federalist-affiliated newspapers in general circulation in 1816, Federalist newspapers were almost twice as likely as their Democratic-Republican counterparts to express the opinion that the autumn harvests would generally be bad.⁴¹ Although harvests and crop yields did not become an explicit political issue in 1816 in the United States, undoubtedly fears of food insecurity manifesting as bread riots or other political disturbances, which occurred in Europe in 1816 and 1817, were lurking just beneath the surface.⁴²

At least one political editor was uncomfortable even admitting that the climate changes were occurring. The *Essex Register*, a Democratic-Republican newspaper from Salem,

³⁹ *American Beacon* (Norfolk, VA), July 4, 1816, 3.

⁴⁰ *Columbian Register* (New Haven, CT), August 9, 1816, 2.

⁴¹ See, e.g., *American Beacon* (Norfolk, VA), July 4, 1816, 3; *Connecticut Journal* (New Haven, CT), August 13, 1816, 2.

⁴² John D. Post, *The Last Great Subsistence Crisis in the Western World* (Baltimore: Johns Hopkins University Press, 1977), 84-85.

Massachusetts, spent most of the summer of 1816 denying that serious weather-related disturbances were even happening, or that their effects would be significant. The paper frequently ran items that were unusually optimistic about the coming harvest, even going so far as to declare that the summer in Canada had been “uncommonly favorable,” despite the fact that weather-related grain shortages were so severe by late July that the British government of Lower Canada enacted a total embargo on wheat exports.⁴³ In another instance the paper tried to prove with selective temperature measurements that the summer was not that much cooler, statistically speaking, than previous seasons. At the end of the summer, after the disappointing harvests were in and the façade of denial could no longer be maintained without equivocation, the *Register* admitted that harvests were “extremely various,” but added hopefully that “when we settle the year’s account, it will not be the worst ever known.”⁴⁴

Contemporary literature regarding climate demonstrates that Americans in 1816 had some understanding of global climate change and its potential causes. Thomas Jefferson wrote in 1785, even before the Industrial Revolution, that the climate of Virginia was growing warmer as a result of increasing human settlement, building development, and encroachment on forests and wilderness.⁴⁵ The events of 1816, however, challenged this view. The Year Without a Summer sparked a spirited public debate—often occurring on the editorial pages of newspapers—about whether the Earth’s climate as a whole was growing warmer or colder and how the events of that summer should be interpreted in a worldwide environmental context.⁴⁶ Advocates of a global cooling thesis often marshaled historical (or pseudo-historical) evidence that Scandinavia had once been much warmer or that Greenland had once been lush to support the argument that the

⁴³ *Daily National Intelligencer* (Washington, D.C.), July 27, 1816, 3.

⁴⁴ *Essex Register* (Salem, MA), August 3, 1816, 4; August 10, 1816, 2; October 16, 1816, 1.

⁴⁵ Thomas Jefferson, “Notes on the State of Virginia,” in *The Portable Thomas Jefferson*, ed. Merrill D. Peterson (New York: Penguin Books, 1975), 116-121.

⁴⁶ See, e.g., *Essex Register* (Salem, MA), July 24, 1816, 2.

planet was chilling.⁴⁷ Warming theorists responded with similar tactics, noting that the Danube used to freeze solid in centuries past and that reindeer once frolicked in Germany's Black Forest.⁴⁸ Americans in 1816 were clearly concerned about climate change, were divided about its causes and effects, and were unable to resolve their doubts in a way that constructed a common consensus regarding what was happening. The weather anomalies of the Year Without a Summer provided an unusual and urgent opportunity to debate climate change, but the public relevance of that debate was not limited to 1816 or to the context of the weather events.

Cultural Reactions: Literature, Religion, and Fear

Moving outside the realm of science, the religious, spiritual, and cultural implications of the Year Without a Summer present a complex picture. Purveyors of apocalyptic or religious messages, perhaps inevitably, co-opted the climate events into their preexisting narratives. A particularly striking example comes from Europe. Sometime in 1815, an Italian astronomer made a prediction that sunspots would increase sharply, eventually blotting out the sun and causing the end of life on Earth. By persons and in circumstances unknown, the "Bologna Prophecy" eventually included a specific date for the apocalypse: July 18, 1816.⁴⁹ The climate anomalies and their supposed cause by sunspots gave the prediction more credibility. The "Bologna Prophecy" does not seem to have caught on in the United States, but it was widely believed in Europe. In London, one Eleanor Saunders, a 62-year-old maid, was so terrified of the impending doomsday that she hanged herself. Her suicide made the papers on both sides of the Atlantic.⁵⁰ That summer at the Villa Diodati, while Mary Shelley was hatching *Frankenstein*, Lord Byron wrote a poem called "Darkness," which literary critics have interpreted as having

⁴⁷ "On the Cold of the Present Season," *Lynchburg Press* (Lynchburg, VA), September 26, 1816, 2.

⁴⁸ *New-England Palladium & Commercial Advertiser* (Boston, MA), September 8, 1816, 2.

⁴⁹ *London Times* (London, UK), June 20, 1816, 3.

⁵⁰ *New-York Weekly Museum* (New York, NY), October 19, 1816, 366.

been directly inspired by the Bologna Prophecy. Byron was writing “Darkness” around July 18, and newspapers he read in Switzerland contained articles reporting the prophecy. Just before writing the poem Byron spoke of being depressed by the foul, wintry weather.⁵¹

Similarly, in American sources expressions of melancholy, depression, and fear pervade letters and diary entries from that summer.⁵² Thomas Robbins, a pastor in South Windsor, Connecticut, often commented on the weather in his daily diary entries, sometimes suggesting that weather conditions were reflective of his own moods and internal spiritual struggles. The words he chose to describe weather events are telling: he often used terms like *distressed*, *concerned*, *afflictions*, *great trials*, *melancholy*, and *evil*. Through the ups and downs of June and July Robbins kept careful track of the weather and harvest prospects. In August he recorded that his congregation “had a very solemn and interesting season of prayer on account of the drought.” When frosts struck at the end of the month he noted, “It is a melancholy time. There was a fast here yesterday on account of the season.”⁵³ Another diarist remarked that the effect of snowfall in Boston was “to scare the people,” though he did not identify precisely what they were scared of.⁵⁴ Sources such as these indicate that gloom, apprehension, and fear were common responses to the climate anomalies.

Most traditional accounts of the Year Without a Summer end with the coming of autumn. For the people who lived through these events—especially those to whom it seemed the summer

⁵¹ Jeffrey Vail, “‘The Bright Sun was Extinguish’d’: The Bologna Prophecy and Byron’s ‘Darkness,’” *The Wordsworth Circle* XXVIII, no. 3 (Summer 1997): 183-92. The poem begins, “I had a dream, which was not all a dream. / The bright sun was extinguish’d, and the stars / Did wander darkling in the eternal space, / Rayless, and pathless, and the icy earth / Swung blind and blackening in the moonless air...” George Gordon Byron, “Darkness,” <http://www.poetryfoundation.org/poem/173081> (accessed May 16, 2013).

⁵² See, e.g., Ruth Henshaw Bascom, Diary, July 6, 1816, Ruth Henshaw Bascom Papers, Mss. Octavo Vols. B, Vol. 23, American Antiquarian Society, Worcester, MA.

⁵³ Thomas Robbins, *Diary of Thomas Robbins, D.D., 1796-1854*, ed. Increase N. Tarbox (Boston: Beacon Press, 1886), I: 665-681.

⁵⁴ William Jenison, Diary, June 8, 1816, Jennison Family Papers 1729-1860, Mss. Octavo Vols. J, Vol. 9, American Antiquarian Society Archives, Worcester, MA.

had never come at all—autumn was not the end. Due to widespread crop failures, the fall and winter of 1816-17 was lean and hungry for many people across the world. Quaker missionaries on the Pennsylvania frontier wrote to their congregations asking for money to buy food staples for Native Americans, who were starving.⁵⁵ In Europe, the weather events and related crop failures created a large-scale subsistence crisis. Hungry beggars swamped cities in Switzerland; sullen workers rioted for bread in England.⁵⁶ Probably due to the lingering effects of Tambora, the following winter was unusually severe. In January 1817, a Worcester, Massachusetts man, Isaiah Thomas, left a stark and telling entry in his journal regarding the severity of the winter. “Fair. Very cold,” Thomas wrote, in feeble, virtually microscopic script with ink that appears stiff and gluey. “Thermometer in the small South room...this morning 14 [degrees] above zero...Coldest night this season, and for 20 years past.”⁵⁷

No one had any idea how long the climate disruptions would last or indeed if the winter would ever end. When another very unseasonable snowstorm struck New England at the end of May 1817, for a brief time newspapers stoked fears that the Year Without a Summer would repeat itself, raising the grim specter that perhaps winter might become a more or less permanent condition. As the summer of 1817 finally began, these fears proved to be unfounded,⁵⁸ but they were certainly real for a brief time.

⁵⁵ Jacob Taylor to Thomas Winter, November 15, 1816, the Philadelphia Yearly Meeting, Indian Committee Records, Microfilm F824, American Philosophical Society, from Quaker Collection Originals, Special Collection, Haverford College, Philadelphia, PA.

⁵⁶ Post, *Last Great Subsistence Crisis*, 86-87.

⁵⁷ Isaiah Thomas, Diary, January 14, 1817, Isaiah Thomas Papers 1748-1874, Mss. Octavo Vols. T, Vol. 8, American Antiquarian Society, Worcester, MA.

⁵⁸ *Boston Daily Advertiser* (Boston, MA), June 4, 1817, 2; June 7, 1817, 2.

Conclusion: “The Mighty Operations of Nature”

In the years and decades that followed, the Year Without a Summer receded into history and crystallized into folklore. Stories of bizarre weather events, particularly those involving the June 7 snowstorm in New England, continued to resurface in memoirs and reminiscences for the rest of the century.⁵⁹ One famous anecdote, originally reported in contemporary newspapers, claimed that an 88-year-old Vermont man got lost in the woods in the June snowstorm and was afflicted by frostbite severe enough to require the amputation of his toes. As they are continually repeated, stories of this nature mingle interchangeably with other folk tales masquerading as facts, such as colorful but unverifiable claims of human fatalities directly attributable to severe weather.⁶⁰ Beyond folklore about the weather itself, the origin of Mary Shelley’s *Frankenstein*, which she asserted was a direct response to the anomalies,⁶¹ has had particular resonance in popular culture. At least two horror films have been made dramatizing the events at the Villa Diodati in the summer of 1816, and a 21st-century novel by popular author Chuck Palahniuk features a modern redress of the *Frankenstein* genesis legend.⁶²

But what did the Year Without a Summer really mean? How did the people who lived through these events, in all their strangeness and contradictions, come to accept and assimilate them into their understanding of the world around them? There can be no single answer; the multitude of disparate reactions defies any pat conclusion or easy characterization. If the climate anomalies were products of nature, there was an argument for treating them not as anomalies at all, but as perfectly normal and ordinary manifestations of much larger natural processes. This

⁵⁹ See, e.g., Sarah Anna Emery, *Reminiscences of a Nonagenarian* (Newburyport, MA: William H. Huse & Co., 1879), 289.

⁶⁰ Stommel and Stommel, *Volcano Weather*, 101-03. Contemporary sources do not report direct fatalities.

⁶¹ Shelley, *Frankenstein*, ix.

⁶² Chuck Palahniuk, *Haunted* (New York: Doubleday, 2005). The two horror films based on the legend are *Gothic* (1986), directed by Ken Russell, and *Haunted Summer* (1988), directed by Ivan Passer.

was the view of one Massachusetts newspaper editor, probably Warwick Palfray, Jr., who wrote perhaps the summer's most eloquent editorial:

Let no one therefore be astonished, even if the sun should be entirely black, or the moon turn red...or earthquakes remove kingdoms, and shake down cities, or mountains vomit fire...or comets gleam athwart the heavens, or stones fall from the sky...let no one be ignorant of the mighty operations of nature, and though uncommon, are a part of the system of things; and are no more wonderful than the showers of spring, or the rising of the sun, or the return of winter.⁶³

Palfray's eloquence—if indeed he was the author—sought to catch the phenomena of the summer of 1816 into a single net of reassurance and faith. In 1816 the sun did not go entirely black, though some feared it might; floods did inundate countries, stones did fall from the sky, and the reports of hail, tempests, and things that could be called hurricanes are extant in the historical record. The pastiche of knowledge from which the people of 1816 drew their assessments of the environment could question, suppose, and conjecture about the events, but it could not fully explain them. True understanding of the “mighty operations of nature” hovered elusively in the gap between knowledge and belief.

⁶³ *Essex Register* (Salem, MA), August 31, 1816, 2.

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